APPENDIX C

WETLAND DELINEATION REPORT

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United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Room 4402
Salt Lake City, Utah 84138-1100
(801) 524-4550
(801) 524-4403 Fax

October 11, 2005

Mr. Grady McNure
Office Chief
Army Corps of Engineers
321 North Mall Drive, Suite L-101
St. George, Utah 84790-7314

RE: Coal Creek Parkway Improvement Wetland Delineation

Dear Mr. McNure:

Enclosed for your review and comment is a draft Delineation of Jurisdictional Waters of the U.S. for the Coal Creek Parkway Improvement EIS. The proposed project is located in Cedar City, Utah.

Coal Creek flows from Cedar Canyon, located southeast of and adjacent to the town of Cedar City. It is a desert stream characterized by annual perennial flow ranging from 5 to 10 cubic feet per second (cfs) and typical peak flow ranging from 100 to 140 cfs. However, as often occurs in such flashy systems, heavy spring thunderstorms, often combined with snowmelt, can result in extremely high flow. One recorded event resulted in a measured flow of 4,600 cfs. These extreme flood events pose a hazard to both property and lives in Cedar City.

Cedar City proposes to modify portions of the channel's cross-section to the northeast of Center Street and stabilize eroded, vertical streambanks that occur southeast of Center Street to accommodate these extreme events. Channel modifications would allow the FEMA 100-year floodplain to be confined to the Coal Creek channel, thereby protecting surrounding residential and business development. As part of the flood control measures anticipated for this project, Cedar City proposes to modify or relocate the existing irrigation diversion structure just west of the Main Street Bridge to alleviate sedimentation and channel capacity issues. Cedar City also proposes to improve and expand an existing parkway and trail system along Coal Creek to enhance aesthetic values and provide recreational opportunities for community residents and visitors.

The Natural Resources Conservation Service (NRCS) has received a Congressional earmark to assist Cedar City in developing and implementing project alternatives. SWCA has been contracted to prepare an Environmental Impact Statement for this project.

If you have any questions or need additional information, please contact Tom Hale, SWCA, at (801) 322-4307 or Karen Fullen, NRCS, at (801) 524-4566. Please address any comments on the draft wetland delineation to Tom Hale, SWCA, 230 South 500 East, Suite 380, Salt Lake City, Utah 84102-2015 with a copy to Karen Fullen at the letterhead address.

Sincerely,

for Karen Fullen

KAREN L. FULLEN
Wildlife Biologist

Enclosure

The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

An Equal Opportunity Provider and Employer

cc:
Sylvia Gillen, State Conservationist, NRCS, Salt Lake City, UT
Lisa Coverdale, Assistant State Conservationist – Programs, NRCS, Salt Lake City, UT
Vane Campbell, Assistant State Conservationist – Field Operations, NRCS, Richfield, UT
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Tom Hale, SWCA, 230 South 500 East, Suite 380, Salt Lake City, UT 84102-2015

DRAFT
DELINEATION OF
JURISDICTIONAL WATERS OF THE U.S.
FOR COAL CREEK EIS
CEDAR CITY, UTAH

Prepared for

USDA-Natural Resources Conservation Service
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Submitted to

U.S. Army Corps of Engineers, Sacramento District
ATTN: Regulatory Branch, Utah Office
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Prepared by

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Salt Lake City, Utah 84102-2015

September 2005

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INTRODUCTION

This document presents the results of a delineation of Jurisdictional Waters of the U.S. conducted for Cedar City, Utah by SWCA Environmental Consultants (SWCA). This delineation of Jurisdictional Waters of the U.S. was conducted as part of the NEPA Environmental Impact Statement (EIS) analysis of the environmental consequences of a floodplain reduction, bank stabilization, and city enhancement project (Figure 1).

REGULATORY SETTING

Jurisdictional Waters of the U.S. are defined as:

> (1) All waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide;
> (2) All interstate waters including interstate wetlands;
> (3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, mineral flats, playas**,** or natural ponds; and the use, degradation or destruction of which could affect interstate or foreign commerce, including any such waters
> (i) That are or could be used by interstate or foreign travelers for recreational or other purposes; or
> (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
> (iii) That are used or could be used for industrial purposes by industries in interstate commerce.
> (4) All impoundments of waters otherwise defined as waters of the United States under the definition;
> (5) Tributaries of waters as described above;
> (6) The territorial seas;
> (7) Wetlands adjacent to waters (other than waters that are themselves wetlands) as described above; and
> (8) Not prior converted cropland. [33 CFR § 328.3(a) and 40 CFR § 230.3(s)]

As Jurisdictional Waters, wetlands are jointly defined by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) as:

> those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. [Environmental Laboratory 1987]

Under Section 404 of the Clean Water Act, dredged and fill material may not be discharged into Jurisdictional Waters of the U.S. (including wetlands) without a permit. Regulated activities include:

- Fills for development
- Water resource projects (such as dams and levees)
- Infrastructure development (such as highways and airports)
- Conversion of wetlands to uplands for farming and forestry

SURVEY AREA

The survey area is located in Iron County, Utah within the historic floodplain of Coal Creek, which runs westward from the Hurricane Cliff mountains into and through the town of Cedar City. The survey area's approximate eastern boundary is at an old diversion structure located at the mouth of Cedar Canyon. Its approximate western boundary is Airport Road, located west of Cedar City. The survey area's northern and southern boundaries are defined by the historic flood plain and off-channel areas upstream, and the channelized portion downstream (Table 1; see Figure 1). The survey area can be accessed along several roads that intersect or parallel Coal Creek in the town of Cedar City.

Table 1. Locational Data for the Coal Creek EIS Survey Area, Taken from USGS 7.5' Quadrangles Cedar City (1950, photo-revised 1978)

Township, Range	Sections
T35S, R11W	34
T36S, R11W	3,10,11,13,14
T36S, R10W	18

The survey area encompasses 96.3 acres and ranges in elevation from approximately 5,610 to 6,014 feet above mean sea level. The general gradient within the survey area is between 1 to 4 percent at the eastern edge of the project boundary. Gradient gradually decreases as you move towards the western boundary. Developmental pressures have reduced the floodplain and off-channel wetlands so that that the majority of the stream is channelized, eliminating off-channel surface connections to the stream. Much of the water in Coal Creek is dedicated to irrigation water rights, so the creek downstream of the Main Street bridge diversion may be dewatered during certain times of the year. From the Center Street Park to the survey area’s western boundary, the stream has been channelized to provide adequate volume for peak flood events. Maintenance of this channel, including periodic dredging, has created berms on either side of the stream.

METHODS

SWCA was contracted by Bowen, Collins, & Associates (Craig Bagley, 1-801-495-2224) to prepare an EIS analyzing the potential impacts to Coal Creek that would result from floodplain reduction, bank stabilization, and enhancement of Cedar City’s existing parkway (Figure 1). One of the resources that is being analyzed as part of the EIS is wetland resources. In order to adequately analyze wetland resources, this wetland delineation was conducted to determine the presence and location of wetland within the project area.

Based on the 1987 Delineation Manual, jurisdictional wetlands were identified using three criteria: hydrophytic vegetation, wetland hydrology, and hydric soils. All three criteria must be present for an area to be considered jurisdictional. See below for explanations of wetland criteria.

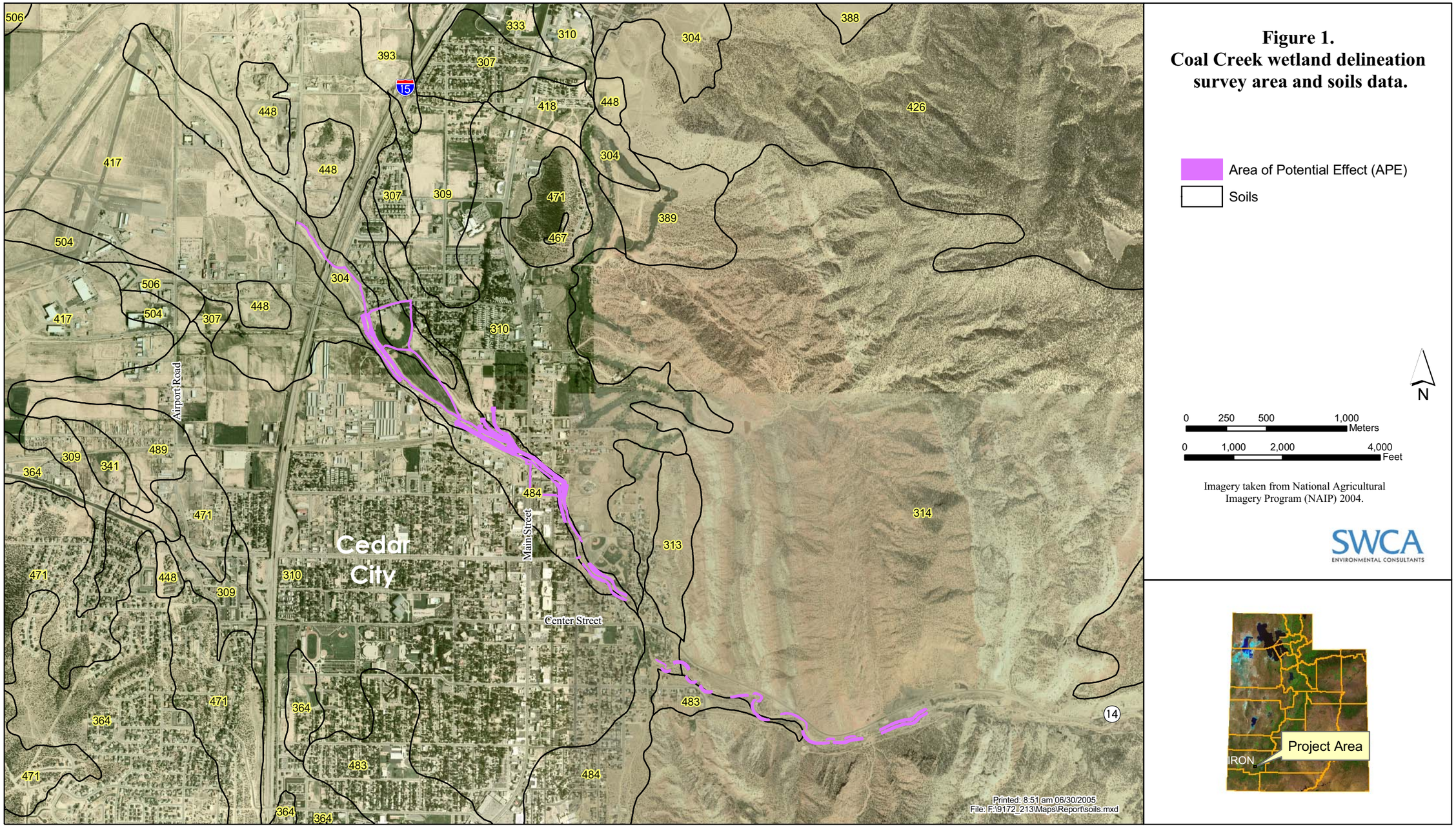

Figure 1. Coal Creek wetland delineation survey area and soil data.

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HYDROPHYTIC VEGETATION

Hydrophytic plants are plants that are adapted to wet conditions. The *1988 National List of Plant Species that Occur in Wetlands* (USFWS 1988) was used to determine the wetland indicator status of dominant plant species encountered on sample plots. Hydrophytic vegetation was considered dominant if 50 percent or more of the dominant plant species (defined as the species that is 20 percent or more of the cover value observed) at the site included facultative (FAC), facultative-wet (FACW), or obligate (OBL) species. Sight-identification was used to determine many plant species. Species that could not be determined in the field were keyed out in the office using *A Utah Flora* (Welsh et al. 1993). The most recent scientific names are used in this delineation report as cited on the PLANTS Database website (USDA 2004).

WETLAND HYDROLOGY

Wetland hydrology refers to the water supply relations of wetlands and is determined to be present if a site supports one or more of the following characteristics:

- Landscape position and surface topography typical of wetlands (e.g., position of the site relative to an upslope water source, location within a distinct wetland drainage pattern, and concave surface topography).
- Inundation or saturation for a sufficient duration during the growing season (either inferred based on field indicators or observed during repeated field surveys).
- Residual evidence of ponding or flooding (e.g., scour marks, sediment deposits, algal matting, and drift lines).

HYDRIC SOILS

Hydric soils are soils that develop anaerobic conditions in the upper part of the profile (above 20 inches soil depth) due to conditions of saturation, flooding, or ponding during the growing season (Environmental Laboratory 1987). During the wetland survey, a spade was used to excavate a soil pit, and Munsell soil color charts were used to determine the soil color (for moist soils) and diagnostic soil features (e.g., oxidized root channels, mottles). In most cases, the following indicators were used to determine the presence of hydric soils in the survey area:

- Saturation for extended durations. This hydric soil indicator was identified by redoximorphic features, a matrix chroma of 1 or less or a matrix chroma of 2 or less with high-chroma mottles.
- Aquic moisture regime. This hydric soil indicator was identified by the presence of water that was presumed to have ponded for long durations and was often accompanied by gleyed soils.

Positive indicators of anaerobic activity such as low chroma colors and occasionally gleyed soils.

Prior to the delineation, aerial photographs, National Wetland Inventory (NWI) maps, soil survey information, and 7.5' USGS topographic maps were used were reviewed to determine the potential for occurrence, nature and distribution of wetlands in the survey area.

There are no NWI maps for this area; however, a review of aerial photography from April 12, 2004 did not show any areas that appeared to be wetlands. None of the surveyed soils within the project area are considered hydric soils (or soils with hydric inclusions) according to the Natural Resources Conservation Service (NRCS) (Appendix B; see Figure 1) (USDA 2005).

A SWCA ecologist (Linda Jones) conducted a wetland delineation field visit between on April 27 and 28, 2005. Climatic conditions were cool, moist, and free of snow cover during the delineation. Prior to winter of 2005, Utah was in a 6-year drought. However, since October 1, 2004, Cedar City has received almost 15 inches of precipitation, and since January 1, 2005, they have received almost nine inches of precipitation (NOAA 2005). For both periods, this is almost twice the normal amount of precipitation that generally falls within the watershed, resulting in above-average spring runoff for the Coal Creek drainage during the time period when the site visit was conducted.

The survey area was walked on both sides of the creek to determine the presence of potential jurisdictional wetlands, including off-channel areas located within the historic meanders on the eastern end of the survey area.

Per the *U.S. Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), a minimum of one sampling point per wetland area was used. One point was generally considered adequate, given that clear boundaries between wetlands and uplands were generally obvious based on topographical relief and vegetation types. Adjacent uplands were also sampled to further confirm wetland boundaries. All wetland data points and boundaries were flagged and recorded using a Trimble GeoExplorer XT global positioning system (GPS) unit. They were then geo-referenced and mapped for delineation report figures. Wetland acreages were determined using ArcView software.

Results and Discussion

Historically, Coal Creek probably had more off-channel wetlands associated with the floodplain than it currently does today. However, the lower two-thirds of the creek that fall within the survey area are highly channelized, and regularly maintained, excavated, and stabilized, which inhibit the formation and persistence of wetland areas. The upper one-third has off-channel areas, but current management of Coal Creek restricts flooding of these areas to large precipitation events, which do not occur regularly. Thus, channel maintenance combined with the lack of hydrology has restricted off-channel wetland formation and persistence along the upper section of the creek.

During the survey for wetlands, only the upper one-third of the creek was found to have wetlands. Within this stretch, a total of 232 square yards of wetlands was delineated.

The first wetland is referred to as W1 04-28, and is a wet meadow approximately 154.3 square yards. It is an off-channel wetland within a slight depression that is directly beneath a steep embankment on the south side of the creek. It is located upstream of the Center Street Park in a section of the creek that that has little development on either side. It is unlikely that this off-channel area is flooded regularly. The dominant herbaceous vegetation in this area is *Juncus balticus* (black tip needle rush, FACW). Dominant woody vegetation in the immediate vicinity (though not in the wetland) included *Tamarix ramosissima* (salt cedar, FAC), *Elaeagnus angustifolia* (Russian olive, FACW), *Salix exigua* (narrowleaf willow, OBL), and *Populus fremontii* (Fremont cottonwood, FACW*) (Appendix A, photograph 1). These shrub and tree species are likely able to reach the water table associated with creek drainage. The source of hydrology for W1 04-28 appears to be drainage (groundwater seepage) from the embankment. Soil survey information classifies the soil in the delineated wetland as Squawcave silt loam, 2 to 15 percent slope. This soil is well drained, and formed in alluvium derived predominantly from sedimentary rocks. See Figure 2 and Appendix B for additional information on the soil types and locations.

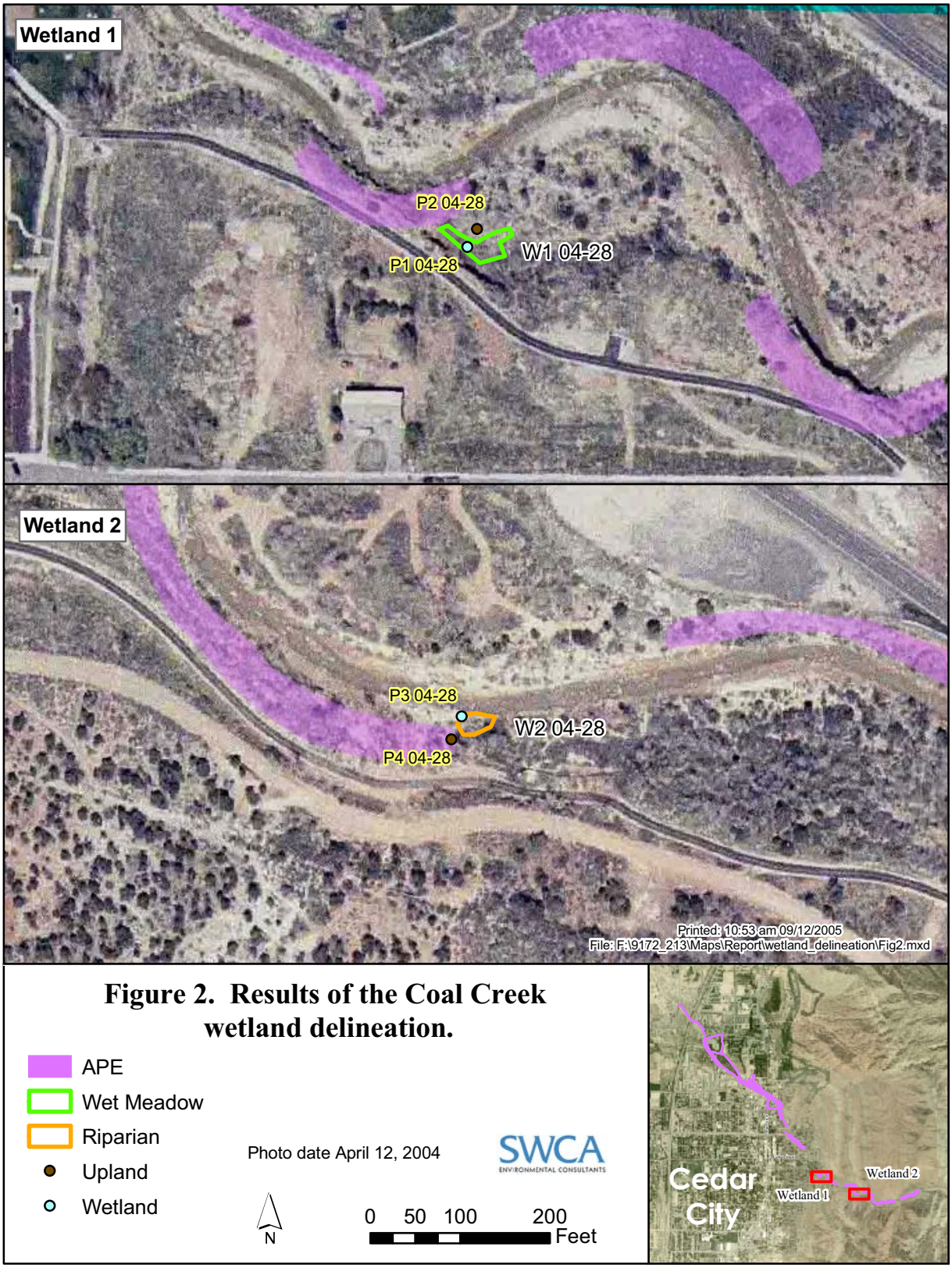

Figure 2. Results of the Coal Creek wetland delineation.

Figure 2. Results of the Coal Creek wetland delineation.

The second wetland is referred to as W2 04-28, and is a riparian wetland approximately 77.7 square yards. It is located directly adjacent to the creek on the south side of the creek approximately 2,165 feet upstream of W1 04-28. This riparian wetland is probably heavily influenced by water levels in the creek, and may have been flooded during spring run off this year. The dominant herbaceous vegetation is *Equisetum laevigatum* (horsetail, FACW), with similar adjacent woody vegetation as that found in W1 04-28 (Appendix A, photograph 2). Herbaceous cover was limited (20 percent), with detritus covering the remainder of the ground. The source of hydrology for W2 04-28 appears to be groundwater associated with the creek, and occasional flooding. Soil survey information classifies the soil in the delineated wetland as Soutin loam, 2 to 5 percent slope. This soil is well drained, and formed in alluvium predominantly from sedimentary rocks. See Figure 2 and Appendix B for additional information on the soil types and locations.

SUMMARY

The delineation of the Coal Creek project area was straightforward since potential wetland areas are easily recognizable and restricted to the upper one-third of the creek where there is potential for wetlands to form. Two jurisdictional wetlands totaling 232 square yards were delineated within the survey area. Current project alternatives that include floodplain reduction, bank stabilization, and enhancement would not impact either wetland.

REFERENCES

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APPENDIX A – PHOTOGRAPHS

Photograph 1. Wetland W1 04-28, a small wet meadow.

Photograph 2. Wetland W2 04-28, a small riparian wetland adjacent to Coal Creek.

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APPENDIX B – EXCERPTS FROM THE NATURAL RESOURCES CONSERVATION SERVICE (NRCS) CLASSIFICATION SYSTEM (UDSA 1974)

Established Series
IRD: GCC/RSJ/MJD
10/98

SQUAWCAVE SERIES

The Squawcave series consists of very deep, well drained, moderately rapidly permeable soils. These soils are formed in alluvium derived dominantly from sedimentary rocks on fan terraces and alluvial fans. Slopes range from 2 to 15 percent. The average annual precipitation is about 11 inches, and the mean annual temperature is about 49 degrees F.

TAXONOMIC CLASS: Loamy-skeletal, mixed, superactive, mesic Xeric Haplogypsids

TYPICAL PEDON: Squawcave silt loam - rangeland. (Colors are for dry soil unless otherwise stated).

A--0 to 3 inches; brown (7.5YR 5/4) silt loam; dark brown (7.5YR 3/4) moist; weak medium platy structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and very fine roots; many fine and very fine vesicular pores; strongly effervescent (18 percent calcium carbonate equivalent), carbonates are disseminated; (gypsum 0.10 percent); mildly alkaline (pH 7.8); abrupt wavy boundary. (3 to 4 inches thick).

Bw--3 to 11 inches; brown (7.5YR 5/4) loam; dark brown (7.5YR 4/4) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic, few medium, many fine and very fine roots; few medium, common fine and very fine tubular pores; strongly effervescent (19 percent calcium carbonate equivalent), carbonates are disseminated; (gypsum 0.72 percent); moderately alkaline (pH 8.0); clear smooth boundary. (7 to 11 inches thick).

Cy1--11 to 22 inches; brown (7.5YR 5/4) very gravelly sandy clay loam; reddish brown (5YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common fine, few very fine roots; common medium and fine tubular pores; strongly effervescent (17 percent calcium carbonate equivalent), carbonates are disseminated; 50 percent gravels, 5 percent cobbles; (gypsum 16.9 percent); mildly alkaline (pH 7.7); abrupt wavy boundary. (11 to 34 inches thick).

Cy2--22 to 56 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium and fine interstitial pores; 5 percent cobbles and 50 percent gravel; common gypsum nodules and filaments (16.9 percent gypsum); strongly effervescent (17 percent calcium carbonate equivalent), carbonates are disseminated; mildly alkaline (pH 7.7); abrupt wavy boundary 26 to 43 thick).

Cy3--56 to 60 inches; light brown (7.5YR 6/4) gravelly loam; reddish brown (5YR 4/4 moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common fine and very fine roots; common medium and fine tubular pores; strongly effervescent (16 percent calcium carbonate equivalent), carbonates are disseminated; 20 percent gravels, 2 percent cobbles; (gypsum 16.3 percent); visible as nodules, filaments and soft decayed gypsum rocks moderately alkaline (pH 8.0).

TYPE LOCATION: Iron County; Cedar City; 100 feet north of the southwest corner of the northeast 1/4 of section 23, T.36S, R.11W; Cedar City Quadrangle; lat. 37 degrees, 39 minutes, 8 seconds N. and long. 113 degrees, 3 minutes, 31 seconds W..

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 47 to 52 degrees F., and the mean summer soil temperature ranges from 65 to 71 degrees. The soil is dry 50 to 75 percent of the time when the soil temperature is above 41 degrees F. The soil moisture regime is aridic bordering on xeric.

The particle size control section averages 18 to 27 percent clay. Rock fragment content ranges 35 to 60 percent in particle size control section. Calcium carbonate equivalent is 15 to 25 percent. It is moderately to strongly effervescent. Reaction is mildly to moderately alkaline. Gypsum ranges from .10 to 17 percent.

The A horizon has value of 5 to 6 dry, 3 or 4 moist and chroma of 4 through 6. Texture is silt loam and loam.

The Bw horizon has value of 5 or 6 dry, 4 through 6 moist and chroma of 4 through 6. Clay content is 18 to 27 percent. Rock fragment range from 0 to 15 percent. Texture is loam and sandy clay loam.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6 dry, and 4 or 5 moist and chroma of 4 through 6. Clay content is 18 to 27 percent. Texture is very gravelly sandy clay loams, gravelly loams and sandy clay loams.

COMPETING SERIES: There are no competing series.

GEOGRAPHIC SETTING: Squawcave soils are on fan terraces at elevations of 5,500 to 6,000 feet. Slopes are 2 to 15 percent. These soils are formed in alluvium derived dominantly from sedimentary rocks. The climate semi-arid. Average annual precipitation is about 10 to 12 inches. The mean annual air temperature is 45 to 50 degrees F., and the average freeze-free period is 120 to 140 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are Ashdown and Cavegulch series. Ashdown soils have fine-loamy particle size control sections. Cavegulch soils have fine-silty particle size control sections.

DRAINAGE AND PERMEABILITY: Well drained; slow runoff; moderately slow permeability.

USE AND VEGETATION: Used mainly for urban and recreational development.

DISTRIBUTION AND EXTENT: Southwest Utah, Iron County, southeast parts of Cedar City. This series is of small extent. MLRA 28A.

MLRA OFFICE RESPONSIBLE: Reno, Nevada

SERIES ESTABLISHED: Iron County, Utah, Iron-Washington Survey Area, 1997.

REMARKS: Diagnostic horizons and features in this pedon are:

Ochric epipedon - the zone from the surface to a depth of 3 inches.

Bw horizons - the zone of structural development with no evidence of either removal of carbonates or clay accumulation from about 3 to 11 inches.

Gypsic horizon - the zone of gypsum accumulation from 11 to 60 inches. (Cy1, Cy2, and Cy3 horizons)

Particle size control section - the zone from 10 to 40 inches.

Additional Data - lab data of typifying pedon (S71UT21-7).

In Utah this series is correlated with semidesert range sites.

The classification is based on the "Keys to Soil Taxonomy, Eighth Edition, 1998". The cation exchange activity class is an estimate based on NASIS data.

Established Series
RSJ/MJD
10/98

SOUTIN SERIES
The Soutin series consists of very deep, well drained soils that formed in alluvium dominantly from sedimentary rocks. Soutin soils are on fan remnants and have slopes of 2 to 5 percent. The mean annual precipitation is about 11 inches and the mean annual air temperature is about 47 degrees F.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Xeric Haplogypsids

TYPICAL PEDON: Soutin loam. (Colors are for dry soil unless otherwise noted.)

Ay1--0 to 6 inches; light brown (7.5YR 6/4) loam, reddish brown (5YR 4/4) moist; weak thin platy structure parting to single grain; soft, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine and very fine random tubular and interstitial pores; gypsum is disseminated in few fine flecks (11 percent gypsum); strongly effervescent (13 percent calcium carbonate equivalent), carbonates are disseminated; slightly alkaline (pH 7.8); abrupt smooth boundary. (3 to 8 inches thick)

Ay2--6 to 10 inches; light brown (7.5YR 6/4) silt loam, reddish brown (5YR 4/4) moist; weak moderately thick platy structure parting to weak very fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine random tubular pores; few fine gypsum filaments (2 percent gypsum); strongly effervescent (15 percent calcium carbonate equivalent), carbonates are disseminated; moderately alkaline (pH 7.9); abrupt wavy boundary. (0 to 5 inches thick)

By1--10 to 15 inches; light brown (7.5YR 6/4) loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; many very fine, common fine and few medium random tubular pores; common fine gypsum filaments (2 percent gypsum); strongly effervescent (16 percent calcium carbonate equivalent), carbonates are disseminated; moderately alkaline (pH 7.9); clear wavy boundary. (3 to 8 inches thick)

By2--15 to 27 inches; light brown (7.5YR 6/4) silt loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; slightly hard, friable, sticky and plastic; few fine and very fine roots; common medium, fine and very fine random tubular pores; many fine gypsum filaments (4 percent gypsum); strongly effervescent (18 percent calcium carbonate equivalent), carbonates are disseminated; slightly alkaline (pH 7.8); gradual wavy boundary. (10 to 15 inches thick)

By3--27 to 37 inches; light brown (7.5YR 6/4) silt loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; many very fine, common fine and few medium random tubular pores; many fine gypsum filaments (17 percent gypsum); strongly effervescent (15 percent calcium carbonate equivalent), carbonates are disseminated; slightly alkaline (pH 7.8); gradual wavy boundary. (7 to 15 inches thick)

By4--37 to 48 inches; light brown (7.5YR 6/4) silt loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; many very fine, common fine and few medium random tubular pores; many fine and medium gypsum filaments (13 percent gypsum); strongly effervescent, (17 percent calcium carbonate equivalent), carbonates are disseminated; moderately alkaline (pH 8.0); gradual wavy boundary. (7 to 12 inches thick)

Cy3--48 to 60 inches; light brown (7.5YR 6/4) silt loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; few fine and very fine roots; common fine, many very fine and few medium pores; many fine gypsum filaments (10 percent gypsum); strongly effervescent (16 percent calcium carbonate equivalent), carbonates are disseminated; moderately alkaline (pH 8.2).

TYPE LOCATION: Iron County, Utah; about 1.3 miles south of Center and Main Street in Cedar City, about 200 feet south and 2,600 feet east of the northwest corner of section 23, T. 36 S., R. 11 W; Cedar City Quadrangle; lat. 37 degrees 39 minutes 45 seconds N. and long. 113 degrees 3 minutes 41 seconds W.

RANGE IN CHARACTERISTICS: The soil moisture regime is aridic bordering on xeric. The mean annual soil temperature is 47 to 52 degrees F, and mean summer soil temperature is 60 to 63 degrees F.

The particle size control section has 18 to 27 percent clay and less than 15 percent sandstone, shale and conglomerate rock fragments. The calcium carbonate equivalent is 10 to 25 percent throughout.

The Ay horizon has hue of 5YR or 7.5YR, value of 5 or 6 dry, 3 or 4 moist, and chroma of 3 or 4. Texture is a loam or silt loam. Reaction is slightly to moderately alkaline.

The By horizon has hue of 5YR or 7.5YR, value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 to 6. Texture is a silt loam, loam, silty clay loam, clay loam. Reaction is slightly to moderately alakline.

The Cy horizon has hue of 5YR or 7.5YR, value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 to 6. Texture is a silt loam, loam, silty clay loam, clay loam. Reaction is moderately to strongly alakline.

COMPETING SERIES:
Deseret (UT) soils are saturated with water for 90 or more days within a depth of 40 inches.
Gyptur (NM) soils have a paralithic contact of soft siltstone at 46 inches.

GEOGRAPHIC SETTING: Soutin soils are on fan remnants. Slope range is 2 to 5 percent. The soil formed in alluvium from shale, sandstone and conglomerate rocks. The average annual precipitation is 10 to 12 inches. The mean annual air temperature ranges from 45 to 50 degrees F. Elevations range from 5,700 to 5,900 feet and the freeze free period is 120 to 140 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Ashdown and Squawcave soils. Ashown soils are fine-loamy and Squawcave soils are loamy-skeletal.

DRAINAGE AND PERMEABILITY: Well drained; slow to medium runoff; moderate permeability.

USE AND VEGETATION: These soils are used for rangeland and urban development. Important plants are big sagebrush, rabbitbrush, Indian ricegrass and bottlebrush squirelltail.

DISTRIBUTION AND EXTENT: Southwestern Utah. MLRA 28A. The series is of small extent.

MLRA OFFICE RESPONSIBLE: Reno, Nevada

SERIES ESTABLISHED: Iron County, Utah, Iron-Washington Area Soil Survey Area, 1997.

REMARKS: Lab data for this pedon is listed as Soil No. S72 Utah 21-8 Sample No. 2 755-2 763.

Diagnostic horizons and features found in this pedon are:

Ochric epipedon - from a depth of 0 to 10 inches (Ay1 and Ay2 horizons).

Gypsic horizon - from a depth of 27 to 48 inches (By3 and By4 horizons).

The classification is based on the "Keys to Soil Taxonomy, Eighth Edition, 1998". The cation exchange activity class is an estimate based on NASIS data.

National Cooperative Soil Survey
U.S.A.

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APPENDIX C – POINT COLLECTION SHEETS

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site:	Coal Creek EIS	**Date:**	April 28, 2005
Applicant/Owner:	NRCS	**County:**	Iron
Investigator:	L. Jones	**State:**	Utah
Do normal circumstances exist on the site?	Y	**Community ID:**	W1 04-28
Is the site significantly disturbed (Atypical Situation)?	N	**Wetland Type:**	Wet meadow
Is the area a potential problem area?	N	**Plot ID:**	P1 04-28

VEGETATION

Dominant Plant Species	Indicator	Percent Cover	Stratum	Dominant Plant Species	Indicator	Percent Cover	Stratum
Juncus balticus	FACW	100	H	*Tamarix ramosissima*	FACW	25	S/T
Elaeagnus angustifolia	FAC	30	S/T	*Populus fremontii*	FACW*	20	S/T
Salix exigua	OBL	25	S/T				

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-)? 5 / 5 = 100 %

Remarks: Trace of *Scirpus* spp. and *Equisetum* spp.

HYDROLOGY

Available Data

X **Recorded Data**

Stream Lake, or Tide Gauge: ___

Arial Photographs: X

Other: ___

___ **No Recorded Data**

FIELD OBSERVATIONS

Depth of surface water: -- inches

Depth to free water in pit: > 14 inches

Depth to saturated soil: > 14 inches

WETLAND HYDROLOGY INDICATORS

Primary Indicators	Secondary Indicators
___ Inundated	___ Oxidized root zones
___ Saturated in the upper 12"	___ Water-stained leaves
___ Water marks	___ Local soil survey data
___ Drift lines	___ FAC-Neutral test
___ Sediment deposits	___ Other
X Drainage patterns	

Remarks: At base of slope (walking path above) and within a small depressional area in historical channel floodplain on south side of Coal Creek. Slope is caving in some places.

Project/Site: Coal Creek EIS **Community ID:** W1 04-28 **Plot ID:** P1 04-28

SOILS

Map Unit Name (series & phase):	Squawcave silt loam, 2-15 percent slope	**Field Observations confirm Map type?**	Yes
Taxonomy (Subgroup):	Xeric Haplogypsids	**Drainage Class:**	Well drained

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Structure, Concretions, etc.
0 - 2	A	5Y 4/3	--	--	Silty clay loam, SBK
2 - 14	B	2.5Y 4/4	--	--	Silty clay loam, SBK

HYDRIC SOIL INDICATORS

___	**Histola**	___	**Concretions**
___	**Gleyed or low-chroma colors**	___	**High organic streaking in surface layer in sandy soils**
___	**Sulfidic odor**	___	**Organic streaking in sandy soils**
___	**Histic epipedon**	___	**Listed on local hydric soils list**
X	**Aquic soil moisture regime**	___	**Listed on national hydric soils list**
___	**Reducing conditions**	___	**Other**

Remarks:

WETLAND DETERMINATION

Hydrophytic vegetation present?	Y	**Hydric soils present?**	Y
Wetland hydrology present?	Y	**Is this sampling point a wetland?**	Y

Rationale: All three criteria met. This wetland is probably receiving groundwater drainage based on its position next to the slope. No obvious surface drainage out that connects it to Coal Creek.

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site:	Coal Creek EIS	**Date:**	April 28, 2005
Applicant/Owner:	NRCS	**County:**	Iron
Investigator:	L. Jones	**State:**	Utah
Do normal circumstances exist on the site?	Y	**Community ID:**	W1 04-28
Is the site significantly disturbed (Atypical Situation)?	N	**Wetland Type:**	Upland
Is the area a potential problem area?	N	**Plot ID:**	P2 04-28

VEGETATION

Dominant Plant Species	Indicator	Percent Cover	Stratum	Dominant Plant Species	Indicator	Percent Cover	Stratum
Cercocarpus ledifolius	NL	20	S/T	*Achnatherum hymenoides*	UPL	100	H
Populus angustifolia	FAC*	20	S/T				
Ericameria nauseosa	NL	60	S/T				

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-)? 1 / 4 = 25 %

Remarks: Within old floodplain, but no hydrophytic vegetation present. Traces of *Bromus tectorum*.

HYDROLOGY

Available Data

X **Recorded Data**

Stream Lake, or Tide Gauge: ___

Arial Photographs: X

Other: ___

___ **No Recorded Data**

FIELD OBSERVATIONS

Depth of surface water: -- inches

Depth to free water in pit: > 6 inches

Depth to saturated soil: > 6 inches

WETLAND HYDROLOGY INDICATORS

Primary Indicators	Secondary Indicators
___ Inundated	___ Oxidized root zones
___ Saturated in the upper 12"	___ Water-stained leaves
___ Water marks	___ Local soil survey data
___ Drift lines	___ FAC-Neutral test
___ Sediment deposits	___ Other
___ Drainage patterns	

Remarks: The wetland for which P1 04-28 refers to is at base of slope. There is an upland area between this wet meadow and the creek itself. No flood debris on the historic floodplain, indicating that the area has not been saturated for a long time.

Project/Site: Coal Creek EIS **Community ID:** W1 04-28 **Plot ID:** P2 04-28

SOILS

Map Unit Name (series & phase):	Squawcave silt loam, 2-15 percent slope	**Field Observations confirm Map type?**	Uknown
Taxonomy (Subgroup):	Xeric Haplogypsids	**Drainage Class:**	Well drained

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Structure, Concretions, etc.
0 - 6	A/B	7.5YR 5/6	--	--	Loam sand, Granular

HYDRIC SOIL INDICATORS

____	**Histola**	____	**Concretions**
____	**Gleyed or low-chroma colors**	____	**High organic streaking in surface layer in sandy soils**
____	**Sulfidic odor**	____	**Organic streaking in sandy soils**
____	**Histic epipedon**	____	**Listed on local hydric soils list**
____	**Aquic soil moisture regime**	____	**Listed on national hydric soils list**
____	**Reducing conditions**	____	**Other**

Remarks: Couldn't dig below 6 inches, lots of cobble, small rocks, and gravel, old alluvium.

WETLAND DETERMINATION

Hydrophytic vegetation present?	N	**Hydric soils present?**	N
Wetland hydrology present?	N	**Is this sampling point a wetland?**	N

Rationale: No criteria met.

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site:	Coal Creek EIS	**Date:**	April 28, 2005
Applicant/Owner:	NRCS	**County:**	Iron
Investigator:	L. Jones	**State:**	Utah
Do normal circumstances exist on the site?	Y	**Community ID:**	W2 04-28
Is the site significantly disturbed (Atypical Situation)?	N	**Wetland Type:**	Riparian
Is the area a potential problem area?	N	**Plot ID:**	P3 04-28

VEGETATION

Dominant Plant Species	Indicator	Percent Cover	Stratum	Dominant Plant Species	Indicator	Percent Cover	Stratum
Equisetum laevigatum	FACW	99	H	*Cercocarpus ledifolius*	NL	5	S/T
Medicago sativa	NL	1	H	*Populus fremontii*	FACW*	40	S/T
Salix exigua	OBL	50	S/T	*Elaeagnus angustifolia*	FAC	5	S/T

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-)? 3 / 3 = 100 %

Remarks: Trace of *Scirpus* and *Equisetum*.

HYDROLOGY

Available Data

X **Recorded Data**

Stream Lake, or Tide Gauge: ___

Arial Photographs: X

Other: ___

___ **No Recorded Data**

FIELD OBSERVATIONS

Depth of surface water: -- inches

Depth to free water in pit: > 14 inches

Depth to saturated soil: > 14 inches

WETLAND HYDROLOGY INDICATORS

Primary Indicators	Secondary Indicators
___ Inundated	___ Oxidized root zones
___ Saturated in the upper 12"	___ Water-stained leaves
___ Water marks	___ Local soil survey data
___ Drift lines	___ FAC-Neutral test
___ Sediment deposits	___ Other
X Drainage patterns	

Remarks: Located in floodplain of Coal Creek, just down stream of an incoming meander that rejoins the main creek, so that the wetland could be influenced by the meander.

Project/Site: Coal Creek EIS **Community ID:** W2 04-28 **Plot ID:** P3 04-28

SOILS

Map Unit Name (series & phase):	Soutin loam, 2-5 percent slope	**Field Observations confirm Map type?**	Yes
Taxonomy (Subgroup):	Xeric Haplogypsids	**Drainage Class:**	Well drained

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Structure, Concretions, etc.
0 - 12	A/B	7.5YR 5/4	--	--	Sand, Granular

HYDRIC SOIL INDICATORS

___	**Histola**	___	**Concretions**
___	**Gleyed or low-chroma colors**	___	**High organic streaking in surface layer in sandy soils**
___	**Sulfidic odor**	___	**Organic streaking in sandy soils**
___	**Histic epipedon**	___	**Listed on local hydric soils list**
X	**Aquic soil moisture regime**	___	**Listed on national hydric soils list**
___	**Reducing conditions**	___	**Other**

Remarks: Floodplain area, though much of the historic floodplain is not influenced by in-stream hydrology.

WETLAND DETERMINATION

Hydrophytic vegetation present?	Y	**Hydric soils present?**	Y
Wetland hydrology present?	Y	**Is this sampling point a wetland?**	Y

Rationale: All three criteria met. This wetland is probably receiving groundwater drainage based on its position next to the measnder. Other areas of floodplain have no vegetation, or upland vegetation.

Data Form
Routine Wetland Determination
(1987 COE Wetlands Delineation Manual)

Project/Site:	Coal Creek EIS	**Date:**	April 28, 2005
Applicant/Owner:	NRCS	**County:**	Iron
Investigator:	L. Jones	**State:**	Utah
Do normal circumstances exist on the site?	Y	**Community ID:**	W2 04-28
Is the site significantly disturbed (Atypical Situation)?	N	**Wetland Type:**	Upland
Is the area a potential problem area?	N	**Plot ID:**	P4 04-28

VEGETATION

Dominant Plant Species	Indicator	Percent Cover	Stratum	Dominant Plant Species	Indicator	Percent Cover	Stratum
Ericameria nauseosa	NL	50	S/T	*Achnatherum hymenoides*	UPL	60	H
Populus angustifolia	FAC*	50	S/T				
Medicago sativa	NL	40	H				

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-)? 1 / 4 = 25 %

Remarks: Within old floodplain, but no hydrophytic vegetation present. Traces of *Bromus tectorum*.

HYDROLOGY

Available Data

X **Recorded Data**

Stream Lake, or Tide Gauge: ___

Arial Photographs: X

Other: ___

___ **No Recorded Data**

FIELD OBSERVATIONS

Depth of surface water: -- inches

Depth to free water in pit: > 14 inches

Depth to saturated soil: > 14 inches

WETLAND HYDROLOGY INDICATORS

Primary Indicators	Secondary Indicators
___ Inundated	___ Oxidized root zones
___ Saturated in the upper 12"	___ Water-stained leaves
___ Water marks	___ Local soil survey data
___ Drift lines	___ FAC-Neutral test
___ Sediment deposits	___ Other
___ Drainage patterns	

Remarks: The point is in an area that is upslope, but also is a relic floodplain that is not flooded anymore.

Project/Site: Coal Creek EIS **Community ID:** W2 04-28 **Plot ID:** P4 04-28

SOILS

Map Unit Name (series & phase):	Soutin loam, 2-5 percent slope	**Field Observations confirm Map type?**	Yes
Taxonomy (Subgroup):	Xeric Haplogypsids	**Drainage Class:**	Well drained

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Structure, Concretions, etc.
0 - 6	A	7.5YR 4/4	--	--	Loam sand, Granular
6 - 12	B	10YR 4/6	--	--	Loamy sand and gravel, Granular

HYDRIC SOIL INDICATORS

____	**Histola**	____	**Concretions**
____	**Gleyed or low-chroma colors**	____	**High organic streaking in surface layer in sandy soils**
____	**Sulfidic odor**	____	**Organic streaking in sandy soils**
____	**Histic epipedon**	____	**Listed on local hydric soils list**
____	**Aquic soil moisture regime**	____	**Listed on national hydric soils list**
____	**Reducing conditions**	____	**Other**

Remarks: Lots of cobble, small rocks, and gravel, old alluvium.

WETLAND DETERMINATION

Hydrophytic vegetation present?	N	**Hydric soils present?**	N
Wetland hydrology present?	N	**Is this sampling point a wetland?**	N

Rationale: No criteria met.